Supplementary Table S1. Treatment abbreviations and description of management protocols for different crops in Indian mustard based cropping systems.

Cropping system	Crop	Tillage			Crop establishment			Residue management		
		PB	ZT	CT	PB	ZT	CT	PB	ZT	CT
F-M	Mustard	One pass of permanent bed planter	One pass zero of till drill	1-harrow, 5-cultivator, 3-leveller	Planted 2-rows on permanent beds at 18.75 × 15 cm spacing with planter	Sowing with Zero till drill at 45 × 15 cm spacing	Sowing with seed drill at 45 × 15 cm spacing	30% retained	30% retained	Removed
CB-M	Cluster bean	One pass of permanent bed planter	One pass of zero till drill	1-harrow, 5-cultivator, 3-leveller	Planted 2-rows on permanent beds at 18.75 × 10 cm spacing with planter	Sowing with Zero till drill at 30 × 10 cm spacing	Sowing with seed drill at 30 × 10 cm spacing	10% retained	10% retained	Removed
GG-M	Green gram	One pass of permanent bed planter	One pass of zero till drill	1-harrow, 5-cultivator, 3-leveller	Planted 2-rows on permanent beds at 18.75 × 10 cm spacing with planter	Sowing with Zero till drill at 30x10 cm spacing	Sowing with seed drill at 30 × 10 cm spacing	100% retained	100% retained	Removed
Mz-M	Maize	One pass of permanent bed planter	One pass of zero till drill	1-harrow, 5-cultivator, 3-leveller	Planted single row on permanent beds 67.5 × 20 cm plant spacing with planter	Sowing with Zero till drill at 60 × 20 cm spacing	Sowing with seed drill at 60 × 20 cm spacing	30% retained	30% retained	Removed
PM-M	Pearl millet	One pass of permanent bed planter	One pass of zero till drill	1-harrow, 5-cultivator, 3-leveller	Planted 2-rows on permanent beds at 18.75 × 10 cm spacing	Sowing with Zero till drill at 30 × 10 cm	Sowing with seed drill at 30 × 10 cm spacing	30% retained	30% retained	Removed

					with planter	spacing				
S-M	Sesame	One pass of permanent bed planter	One pass of zero till drill	1-harrow, 5-cultivator, 3-leveller	Planted 2-rows on permanent beds at 18.75 × 10 cm spacing with planter	Sowing with Zero till drill at 30 × 10 cm spacing	Sowing with seed drill at 30 × 10 cm spacing	20% retained	20% retained	Removed

F-M: Fallow-Mustard, CB-M: Cluster bean-Mustard, GG-M: Green gram-Mustard, Mz-M: Maize-Mustard, PM-M: Pearl millet-Mustard, S-M: Sesame-Mustard, PB: Permanent bed, ZT: Zero tillage, CT: Conventional tillage